

What is claimed is:

1. A method for delivering atrial defibrillation therapy, comprising:
  - 5 detecting an episode of atrial fibrillation or other atrial tachyarrhythmia;
  - detecting ventricular depolarizations (R-waves) with a ventricular sensing channel, wherein R-waves are detected when a sensed ventricular electrogram value exceeds a dynamically varying threshold value;
  - starting a shockable interval timer upon detection of an R-wave;
  - 10 detecting separate events in the ventricular sensing channel with a specified low shock threshold value and a specified high shock threshold value, wherein the low shock threshold value is lower than the dynamically varying threshold and the high shock threshold value is higher than the dynamically varying threshold;
  - restarting the shockable interval timer if the sensed ventricular electrogram
  - 15 exceeds the low shock threshold value; and,
  - delivering an atrial defibrillation shock pulse synchronously with a detected R-wave if the shockable interval timer has reached or exceeded a specified minimum value and if the sensed ventricular electrogram value exceeds the high shock threshold value.
- 20 2. The method of claim 1 further comprising:
  - starting the shockable interval timer when a sensed ventricular electrogram value exceeds the low shock threshold value; and,
  - delivering an atrial defibrillation shock pulse synchronously with a detected R-
  - 25 wave if the shockable interval timer has reached or exceeded a specified minimum value and if the sensed ventricular electrogram value exceeds both the dynamically varying threshold value and the high shock threshold value within a specified maximum time interval.

3. The method of claim 1 wherein the dynamically varying threshold value is set to a specified percentage of the peak absolute value of each detected R-wave and then decays to a specified minimum threshold.

5 4. The method of claim 3 wherein the dynamically varying threshold value decays exponentially.

5. The method of claim 1 wherein the specified low and high threshold values are specified percentages of a specified minimum value for the dynamically varying  
10 threshold.

6. The method of claim 1 further comprising dynamically adjusting the gain of the ventricular sensing channel.

15 7. The method of claim 1 wherein an episode of atrial fibrillation or other tachyarrhythmia is detected by detecting atrial depolarizations with an atrial sensing channel and determining an atrial rate therefrom.

8. The method of claim 1 further comprising detecting a ventricular  
20 tachyarrhythmia when a ventricular rate exceeds a specified limit value, with the ventricular rate determined as the interval between R-waves detected when a sensed ventricular electrogram value exceeds the dynamically varying threshold value.

9. An apparatus for delivering atrial defibrillation therapy, comprising:  
25 means for detecting an episode of atrial fibrillation or other atrial tachyarrhythmia;

means for detecting ventricular depolarizations (R-waves) with a ventricular sensing channel, wherein R-waves are detected when a sensed ventricular electrogram value exceeds a dynamically varying threshold value;

means for starting a shockable interval timer upon detection of an R-wave;

means for detecting separate events in the ventricular sensing channel with a specified low shock threshold value and a specified high shock threshold value, wherein the low shock threshold value is lower than the dynamically varying threshold  
5 and the high shock threshold value is higher than the dynamically varying threshold;

means for restarting the shockable interval timer if the sensed ventricular electrogram exceeds the low shock threshold value; and,

means for delivering an atrial defibrillation shock pulse synchronously with a detected R-wave if the shockable interval timer has reached or exceeded a specified  
10 minimum value and if the sensed ventricular electrogram value exceeds the high shock threshold value.

10. The apparatus of claim 9 further comprising means for starting the shockable interval timer when a sensed ventricular electrogram value exceeds a specified low  
15 threshold value, and to deliver an atrial defibrillation shock pulse synchronously with a detected R-wave if the shockable interval timer has reached or exceeded a specified minimum value and if the sensed ventricular electrogram value exceeds both the dynamically varying threshold value and the high shock threshold value within a specified maximum time interval.

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11. The apparatus of claim 9 wherein the dynamically varying threshold value is set to a specified percentage of the peak absolute value of each detected R-wave and then decays to a specified minimum threshold.

25 12. The apparatus of claim 11 wherein the dynamically varying threshold value decays exponentially.

13. The apparatus of claim 11 wherein the specified low and high threshold values are specified percentages of a specified minimum value for the dynamically varying threshold.
- 5 14. The device of claim 9 wherein the means for detecting an episode of atrial fibrillation or other tachyarrhythmia is an atrial sensing channel which detects atrial depolarizations from which an atrial rate can be determined.
- 15 15. The apparatus of claim 14 further comprising means for dynamically adjusting the gain of a sense amplifier in the atrial sensing channel.
16. The apparatus of claim 9 further comprising means for detecting a ventricular tachyarrhythmia when a ventricular rate exceeds a specified limit value, with the ventricular rate determined as the interval between R-waves detected when a sensed  
15 ventricular electrogram value exceeds the dynamically varying threshold value.
17. A cardiac rhythm management device, comprising:  
an atrial sensing channel for detecting atrial depolarizations (P waves); and;  
a ventricular sensing channel for detecting ventricular depolarizations (R-  
20 waves);  
a shock pulse generator for generating atrial defibrillation shock pulses;  
a controller for controlling the operation of the device, wherein the controller is programmed to detect R-waves when a sensed ventricular electrogram value exceeds a dynamically varying threshold value and to detect separate events in the ventricular  
25 sensing channel with a specified low shock threshold value and a specified high shock threshold value, wherein the low shock threshold value is lower than the dynamically varying threshold and the high shock threshold value is higher than the dynamically varying threshold; and,

wherein the controller is programmed to detect episodes of atrial fibrillation or other atrial tachyarrhythmias from detected P waves, and, upon detection of an atrial tachyarrhythmia, to:

start a shockable interval timer upon detection of an R-wave;

5 restart the shockable interval timer if the sensed ventricular electrogram exceeds the low shock threshold value; and,

deliver an atrial defibrillation shock pulse synchronously with a detected R-wave if the shockable interval timer has reached or exceeded a specified minimum value and if the sensed ventricular electrogram value exceeds the high shock threshold  
10 value.

18. The device of claim 17 wherein the controller is programmed to start the shockable interval timer when a sensed ventricular electrogram value exceeds a specified low threshold value, and to deliver an atrial defibrillation shock pulse  
15 synchronously with a detected R-wave if the shockable interval timer has reached or exceeded a specified minimum value and if the sensed ventricular electrogram value exceeds both the dynamically varying threshold value and the high shock threshold value within a specified maximum time interval.

20 19. The device of claim 17 wherein the specified low and high threshold values are specified percentages of a specified minimum value for the dynamically varying threshold.

20. The device of claim 17 wherein the gain of a sense amplifier in the atrial  
25 sensing channel is dynamically adjusted.